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Proposed Revision of North American Smilaces.

A careful examination of the authorities on *Smilax*, Tourn., and of the Columbia College specimens of this genus, convinces me that no sound and satisfactory revision of the North American species, subspecies and varieties, some thirty in number, can be made without new and complete specimens of most of the forms, and accurate field notes concerning many of them. A complete specimen of *Smilax* includes the base of the stem (at least a foot of it) with enough of the rhizome and root attached to show clearly whether there is any tuberous development; two flowering branches not less than two feet long—one staminate and one pistillate—and a fully matured fruiting branch of equal length. The field notes should state distinctly the habitat, degree of abundance, size, duration of leaf, time of flowering and fruiting, exact color and odor of flowers, and color of fruit while ripening and also when mature; in the case of all anomalous (perhaps hybrid) forms the names of other species growing near should be noted. Anything, however meagre, relating to the genus will be welcome, and I venture to hope that botanists and amateurs throughout the country will aid me in obtaining from their respective sections the necessary material for an adequate (and much needed) revision of our *Smilaces.* Fresh specimens, snugly rolled in newspapers, will be even preferable to exsiccatæ, and will be much less trouble to the sender.

It is believed that *Smilax* is always entomophilous, and accurate observations as to the insects by which fertilization is effected are especially desired. E. E. STERNS,

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Reviews of Foreign Literature.

Ueber künstliche Vergrünung der Sporophylle von Onoclea Struthiopteris, Hoffm. By K. Gœbel. (From the Berichte der deutschen botanischen Gesellschaft, Dec. 16, 1887.)

This short paper contains an account of an experiment tried in the botanical garden at Marburg. It begins with a reference to some previous experiments of the author, to show that in a number of organs metamorphosis is a real transformation which may be experimentally proven, and not the ideal, indefinite con ception which has so long been the prevailing notion in regard to plant metamorphosis. In one of these experiments the effort was made to prove that the sporophyllum (fruit leaf or fertile leaf) of *Botrychium Lunaria* was the result of the transformation of a foliage leaf.* Failing to prove this experimentally, the attempt was afterward repeated with *Onoclea struthiopteris* and satisfactory results obtained.

He explains what may be considered experimental proof as follows: It is necessary to show that the beginnings of the sporophyllum and foliage leaf agree, and that it is possible to cause such foundations, as by undisturbed growth would have developed into fertile leaves, to develop into foliage leaves. It is also especially desirable to cause transition forms between foliage and fertile leaves to appear. This is the case because the beginnings of both kinds of leaves, until a relatively late period of development, are so similar that it is only by transition forms that it is possible to determine with certainty whether the organ in question is really a fertile leaf changing to the form of a foliage leaf, or only a common foliage leaf.

Among those ferns which show a difference between fertile and foliage leaves, the genus *Onoclea* is the most striking. The examples chosen for the experiment were large, healthy, well-developed plants. At different times all the foliage leaves were removed, thus causing an abnormally rapid growth of those undeveloped foundations of both foliage and fertile leaves which were already formed.

Naturally, only those plants in which the fertile leaves were already started and whose sterile leaves were unfolded, were of use in the experiment. For example, one whose leaves were removed the 10th of May, before all the foliage leaves had unfolded and probably before any fertile leaves had started, in the course of the summer produced eleven sterile and one perfectly normal fertile leaf. In the other examples the leaves were removed later in the season, after the foliage leaves had unfolded and the beginnings of the fertile ones formed. In these cases the transformation of the fertile to the foliage leaf appeared in the plainest manner and in different stages.

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*Vergleichende Entwicklungsgeschichte der Pflanzenorgane: Schenks Handbuch III., page 111.

The most marked middle or transition stages, referred to above as so desirable to produce, were shown in the tip or upper half of the leaf becoming green like the real leaf, while the lower part of it was supplied with more or less sori. This is easily understood if we remember that the point of vegetation or growing point of the fern frond remains apical during its entire growth, so the tip might change its character, owing to outside circumstances of too recent date to affect the growth of the lower part. Furthermore, the pinnules of the frond instead of rolling under as in the ordinary fertile leaf, were spread out flat at the tip, this tendency diminishing regularly toward the base. The amount of chlorophyll in the leaf tip was equal to that of the ordinary leaf. At the same time a very remarkable change in the position of the frond occurred. That portion on which the spores had developed retained the usual upright position, while the upper part took on the oblique direction of the sterile leaves. In one case, where the line between fertile and sterile parts was sharply defined, the upper part bent so strongly as to form almost a right angle with the lower. The venation of the fertile leaf was modified somewhat, making it agree more or less closely with that of the foliage leaf. The author holds the most remarkable result of the experiment to be, that as the "vergrünung" advances the development of sori is hindered. When a leaf division changes over to the sterile form before the sori begin to be developed, they are never formed; but when the formation of sori has begun before the leaflet has been subjected to this outward change, then from the apex to the base all the different stages of sorus building can be found. In one extreme case only an indusium was found, indicating that this organ is the first to originate. Other sori had sporangia pretty well developed, but none produced ripened spores. It must be added here that the season proved a very unfavorable one, so that other ferns of the same genus failed to produce ripe spores.

The interpretation of the results of the experiment is confirmed or supported by similar developments occurring on plants growing wild and entirely uninjured by artificial treatment. Such examples have been described by Milde, Luerssen and others, occurring especially on young plants producing spores for the first time.

Onoclea Struthiopteris is said to occupy a high place among vascular cryptogams as regards the variety of leaf development, producing three different kinds, viz.: "Niederblätter," or "Cataphylla," foliage leaves and fruit leaves. The "Cataphylla" have been proven by the author, in other cases, to be transformed foliage leaves, and the same fact is confirmed by the stunted blade of the cataphyllum which is visible to the naked eye. Therefore, the structure of this plant is reduced to a much simpler matter than appearances would indicate. The plant forms only one kind of leaf-rudiment, and this is that of foliage leaves from which, according to certain fixed influences, a certain number are developed into cataphylla, certain others into fruit leaves and the remainder into foliage leaves.

This simple experiment is only one from a long list of morphological investigations carried on by the author, who is best known to us through his text-book, "Outlines of Classification and Special Morphology of Plants." It is of special interest, owing to its simplicity, and at the same time the important bearing it has on the subject of plant morphology.—E. L. G.

Allii Species Asiæ Centralis.—By E. Regel. (Pamph., pp. 8vo. 87, 8 plates; St. Petersburg, 1887.)

This is an enumeration, with descriptions of new species and varieties of the genus *Allium*, as represented in Central Asia, with full localities of the specimens examined. It includes 138 species, most of them restricted in distribution to the region. A conspectus of the species precedes the main portion of the work, five sections of the genus being recognized. Twenty-nine of the species are represented on the plates, which are excellently done.

On the Present Position of the Question of the Sources of the Nitrogen of Vegetation—Preliminary Notice.—By Sir J. B. Lawes and J. H. Gilbert, LL.D. (Proc. Royal Soc., xliii., pp. 108-116.)

The question of the source of nitrogen in plants has long been a subject of discussion and experiment at the several centres of study of agricultural chemistry, and the results reached by the authors of the paper here reviewed are among the most interesting and valuable of any recorded. The present article concisely presents the facts gained and hypotheses suggested by recent observations. While the assimilation of free nitrogen by chlorophyllous plants may be disposed of as not proven, it is assumed by some that it is brought into combination in various ways within the soil under the action of electricity, fungi or micro-organisms, and among the latter the mycorhiza hyphæ of Cupuliferæ, made known by Frank, and the nodules on the roots of certain Leguminosæ have been suspected as agents of nitrification. Drs. Lawes and Gilbert are not inclined to attribute any considerable action to the structures mentioned, but, pointing out that while even the feebly nitrogenous sub-soil of Rothamsted (containing only 0.04% of nitrogen) carries some 20,000 pounds of the element per acre, suggest that the Fungi, etc., may serve the crops by in some way bringing this large store of combined nitrogen into a soluble condition for assimilation.—N. L. B.

Index to Recent American Botanical Literature.

Agricultural College of Michigan—Annual Report, 1887.—L. H. Bailey, Jr. (Bulletin No. 31, pamphlet, 96 pp.; illustrated.)

This contains a good deal of interesting and valuable information on practical horticulture.

Bacteria from a Botanical Standpoint.—Wm. Trelease. (Weekly Medical Review, xvii., pp. 88-92 and 127-131.)

A brief and clear account of these organisms as studied in the botanical rather than the pathological laboratory, though the paper concludes with some pretty strong advice to the physicians of St. Louis regarding the water-supply of the city.

Botanical Institute at Tübingen.—Douglas H. Campbell. (Bot. Gaz., xiii., pp. 1-4; with portrait of Dr. W. Pfeffer.)

Characeæ of America—Part I.—Dr. T. F. Allen. (Pamph., large 8vo., pp. 64, 55 illustrations; New York, 1888; published by the author.)

The very welcome and long expected results of Dr. Allen's prolonged studies of this neglected class of plants come to us in the form of a beautifully printed and illustrated work which must stimulate their investigation, and for the first time affords a ready